A Survey of Library Support for Formal Undergraduate Research Programs

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Abstract: Undergraduate research is defined by the Council on Undergraduate Research (CUR) as "an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline." This study serves as a snapshot of current library practices in relation to formal undergraduate research programs and identifies common elements of library support among different types of institutions. The results of this research fills a gap in both the library and education literature, provide critical background data for libraries wishing to build support for undergraduate research programs, and suggests a foundation for further research into an underexplored area.

Introduction

Since the publication of "Reinventing Undergraduate Education: A Blueprint for America's Research Universities,"[1] universities have worked to develop and strengthen inquiry-based curricula for undergraduates that is aligned with faculty members' scholarly and creative efforts. Fifteen years later, there is a growing body of evidence indicating that scholarly disengagement can be reversed when students participate in high quality, discipline-oriented undergraduate research programs.[2] Undergraduate research is defined by the Council on Undergraduate Research (CUR) as "an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline."[3] Examples of programs include:

1. Formal undergraduate research opportunities program (such as that within Carnegie Mellon University's Department of Biological Sciences: A representative undergraduate research program in the sciences where students conduct research under faculty mentorship. http://www.cmu.edu/bio/research/undergrad_research/)
2. Undergraduate research symposia that highlight original and creative undergraduate work (such as the University of Wisconsin-Madison's Undergraduate Symposium: An annual event showcasing undergraduate student work across disciplines. http://www.learning.wisc.edu/ugsymposium/)
3. Undergraduate research journals that publish original undergraduate research (such as Illinois Wesleyan University's *Undergraduate Economic Review*: An open access, disciplinary undergraduate research journal. http://digitalcommons.iwu.edu/uer/)
4. Undergraduate honors programs (such as the University of Illinois at Urbana-Champaign's James Scholar Program: An institution specific honors program that provides support for student-initiated projects with faculty

support. http://advising.ahs.illinois.edu/JamesScholar/)

5. Other formal initiatives that foster original undergraduate research or creative works (such as the University of Illinois' Ethnography of the University Initiative: An inter-institutional and cross disciplinary program that fosters ethnographic, course-based research that is archived in the campus institutional repository. http://www.eui.illinois.edu/)

Undergraduate participation in such programs aligns with gains in a host of educational outcomes, and it is well established in the higher education literature that undergraduate research programs are a valued and viable method of improving students' academic experience.[4] The Association of American Colleges and Universities (AAC&U) includes undergraduate research programs on its list of "High-Impact Educational Practices,"[5] and many academic organizations reward exemplary undergraduate research with grants and awards.[6]

While libraries by definition support undergraduates' general information needs, with increased attention and formal support for programs on the discipline and university level, libraries have an opportunity to engage and influence future scholars during the formative undergraduate research process. There are numerous examples of dedicated support for undergraduate research. Oberlin College in Ohio, for example, guarantees the use of a scholar study for a semester to those seniors who have been accepted into their department's honors program.[7] The University of California Irvine Libraries and the Undergraduate Research Opportunities Program (UROP) have a partnership that includes a dedicated space in the library for UROP students, unlimited interlibrary loan, extended loan periods of UC Irvine materials, and a research award.[8] But there are other shifts that libraries might make as well. Information literacy instruction, for example, continues to be a major initiative within libraries, but is largely focused on locating information during course-related instruction as opposed to developing critical thinking skills addressing the undergraduate student's role as an author, an essential

element in a formal undergraduate research program. With the production of original scholarly or creative work comes the expectation to disseminate and share the new knowledge or creation with the scholarly community. Are libraries supporting the dissemination of the results of undergraduate research, and, if so, how?

With the growth of undergraduate research opportunities, librarians must seek new ways to serve and support the undergraduate researcher and their faculty mentors.[9] The purpose of this study is to identify the range of library support for formal undergraduate research programs through instruction, collections, space, research consultations, and infrastructure for dissemination and publication of original student work. The results of this research intends to fill a gap in both the library and education literature by benchmarking the types and range of services offered for undergraduate research programs based on a national survey of universities and colleges. It provides critical background and data to library administrators and undergraduate research programs in order to deepen their understanding of current and potential library services.

Literature review

Undergraduate research is a well-documented topic in the education literature, especially after the publication of the Boyer Commission report in 1998. Though our study uses the CUR definition of undergraduate research (because CUR is the leading national organization in this area), it bears mentioning that there are numerous other definitions of undergraduate research, and that institutional culture may impact how programs are defined.[10] The commonalities that emerge across discussions of undergraduate research lie in strong faculty-student mentor-mentee engagement, a clear and articulated research or creative process appropriate for the discipline's conventions and habits of mind, and the expectation that the end product will be shared and disseminated, again in accordance with disciplinary conventions. There are a plethora of articles and books discussing the benefits of engaging students in

undergraduate research projects, including "empowered learning, informed learning and responsible learning," "understanding of the ethical considerations inherent in research," and increased awareness of graduate school expectations including interest in their area of study as a profession.[11] Lopatto reported survey results that showed students' gaining skills in "design and hypothesis formation, data collection and interpretation, information literacy, communication and computer work."[12] Both Russell and Hu et al[13] identify undergraduate research programs as a means to develop and nurture engagement and skill development in minority populations, especially in STEM fields.

While undergraduate research is perhaps most associated with STEM fields, there is evidence that the arts and humanities are increasingly engaging students in in-depth projects. CUR recently published "Creative Inquiry in the Arts & Humanities: Models of Undergraduate Research," which presents case studies of undergraduate research programs at a variety of institutions, in order to promote stronger programs in these disciplines.[14] CUR also collected essays from faculty in literary studies in "Reading, Writing and Research: Undergraduate Students as Scholars in Literary Studies," on programs, courses and seminars, and how faculty can work effectively with students in this area.[15]

Discussions of librarians, the library, or library services are overwhelmingly absent from the education literature on undergraduate research programs. One exception is Thiry and Laursen's study of the biosciences undergraduate research programs at the University of Colorado at Boulder, in which students reported that workshops designed to enhance "library skills" not only introduced "new skills," but the students demonstrated transference of what they learned to their advanced coursework.[16]

There is also a significant gap in the library literature in regards to undergraduate research programs: there exists no overview of the current landscape of library support for undergraduate research programs, only anecdotes and case studies. However, there is a growing body of literature that indicates that this is an area of increasing interest and formal support. One part of the larger library

literature that does address engagement with undergraduate researchers is that of special collections and archives. A search across issues of *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage,* yields a wealth of examples of how archivists and special collection librarians are working with faculty to engage undergraduates in research using materials such as artists books, rare materials, and ephemera.[17]

Other, more general examples are also present in the library literature. At the Second Schreyer National Conference in 2001, Carol Wright discussed her work with undergraduate honors students across several disciplines who engaged in deep research projects.[18] Wright provides a succinct summation of the different varieties of undergraduate research at her institution:

> Students in the hard sciences most often participate in ongoing research of the mentor, join a research team, and are assigned specific responsibilities in the lab or for particular subsets of data collection and analysis. […] The polar opposite of this experience is the creative thesis, in which students may complete projects such as writing a computer software program or creating graphic art, performance art, photographic essays, musical scores, etc.[19]

Wright goes on to note that for each group, librarians can work with faculty mentors to include traditional, literature based research to aid in students' progress towards their research goals. Wright discusses a credit-based option for undergraduate researchers in which students' search skills are developed and they are exposed to topics related to scholarly communication, such as copyright and research ethics. Wright collaborated with a colleague to write a follow-up article in which the portfolio students created during the course was used to assess the honors students' research process.[20]

Stamatoplos[21] provides an excellent overview of the different needs of undergraduate researchers and the potential contributions that librarians can make to undergraduate researchers' work. Emily Daly described a study of undergraduate researchers at Duke University, in which she

interviewed nine students from across the university about their use and satisfaction with the library services provided to them as undergraduate researchers. Her study found that "many [students] were unaware of the full extent of library services and resources offered to them,"[22] and while each student seemed confident in their research skills, Daly noted that "several students did demonstrate gaps in their understanding of library services and the most efficient ways to access and evaluate library resources over the course of their interviews."[23] Both librarians and the students who participated in the study identified the need for increased marketing of the services geared specifically towards undergraduate researchers. These examples point to an untapped source of opportunities to connect with and educate future researchers, artists and scholars.

When reviewed as a whole, the existing literature says very little about the range of services offered in college and research libraries for formal undergraduate research programs. As a result it can be difficult for libraries to judge what might be appropriate or useful services to offer or to engage in conversations with administrators who support such programs. Stamatoplos acknowledges that: "…the literature reveals no apparent examples or documented models of library engagement with undergraduate researchers and programs, only familiar models centered on engagement with students and faculty through the curriculum are available."[24] In order to fill this gap in the literature and to engage the academic library with these questions of support, the authors of this study conducted a survey meant to benchmark the range of current library support for formal undergraduate research programs.

Methodology

The goal of the survey was to assess whether or not libraries were aware of undergraduate research programs on their campuses, whether they were offering support specific to undergraduate research programs, and, if so, what types of support were offered. We were also interested if and how

libraries participated in the structure of undergraduate research programs. Finally, the survey was meant to gauge interest in further discussion of this topic either within ACRL or as part of a further research project.

Survey Design

The instrument was a branched survey consisting of 19 total questions (see Appendix A for the instrument). Only two questions were required (Questions 1 and 14). The majority of the questions had a set of options that the respondent could choose from as well as an 'other' category to allow free text responses; others required a free text response only.

The survey was divided into four areas:

- Awareness of undergraduate research programs on campuses (Questions 1–3)
- Description of how libraries are involved (or not) in undergraduate research programs (Questions 4–12)
- Interest in a national forum on topic (Question 13)
- Demographic and contact information (Question 14–19)

At the beginning of the survey and throughout were reminders of the CUR definition of undergraduate research programs, as well as the reminder that excluded from our definition was research conducted as part of normal class work (outside of the framework of any of the described programs above) or work completed with an individual faculty member for compensation.

Awareness of Undergraduate Programs on Campus (Q1–3): We first wanted to establish that the respondent had knowledge of what undergraduate research programs were present on campus, if any. The first question of the survey asked whether or not the institution had any formal undergraduate research programs in place. Because we were interested in those libraries at institutions who did have such programs, if the respondent answered 'no' or 'I don't know,' they were directed to the last section

of the survey to provide demographic information. For those who answered 'yes' or 'other,' we also asked what types of programs were in place and in what disciplines.

Description of how libraries are involved (or not) in undergraduate research programs (Q4–12): This section was the most extensive. The questions in this section were designed to address the gaps that we found in the literature. Question 4 asked whether the library provided support specifically for undergraduate research programs. If the respondent answered 'no,' they were directed to a follow-up question (Q5) that asked why such support was not provided. After completing Question 5, the respondent was directed to the last section of the survey to provide demographic information. The remainder of the questions asked what types of support were provided, including whether there were library staff dedicated to the support of undergraduate research programs (Q6), determination of specific categories of library support (e.g. space, collections, printing services, etc.) (Q7) and, if publishing and dissemination support was provided, how this was manifested (Q8).

While this set of questions enabled us to understand better the range of services libraries offered and whether there were dedicated personnel, we wanted to know if libraries were represented within the formal structure of undergraduate research programs (e.g. advisory boards or steering committees) (Q9). This could be an indicator of the value the institution found in library participation. We also provided a free text response for respondents to provide other information about their support of undergraduate research programs (Q12).

Interest in a national forum on topic (Q13): We wanted to gauge whether there would be interest in some kind of forum or discussion of this topic whether through an organization like the Association of College and Research Libraries (ACRL) or some other national forum.

Demographic and Contact Information (Q14–19): This set of questions asked for the name of the institution, the size of the undergraduate student body, the role of the respondent and whether the

respondent would be willing to be contacted for further research. We requested this information to allow us to do some analysis of the responses based on the size and type of institution.

We developed drafts of the survey with input from local survey construction experts. The survey instrument and protocols were reviewed by the Institutional Review Board at the University of Illinois at Urbana-Champaign but were found to be exempt given that the study was focused on services offered by institutions. We field tested the survey with respondents at two different types of institutions, and made revisions accordingly before sending out the survey for wider distribution.

Survey Population and Dissemination

Because we did not wish to hear from a single library more than once, we decided to do a targeted invitation for the surveys. We also wanted to target libraries which were likely to have services for undergraduate research programs. For our survey population, we used the membership of the Council on Undergraduate Research (CUR) (n=627), the Association of Research Libraries (ARL) (n=125), the Oberlin Group (n=80), and the National Institute for Technology in Liberal Education (NITLE) (n=139).[25] Where an institution belonged to one or more of these organizations, we only sent one invitation to the survey; the total number of invitations sent was 758. We used the Carnegie Basic and Control Classifications to characterize the survey population.[26] Approximately half of the institutions surveyed were private, not-for-profit (49.7% or 377); the remainder were public (50.3% or 381). We had no private, for-profit institutions in our survey population. Twenty-seven percent (n=205) were doctoral granting institutions, 39.4% (n=299) masters colleges or universities, 27.7% (n=210) were baccalaureate colleges, and the remainder (5.9%) were associate, special focus, or tribal institutions.

[Insert Table 1]

Once the list of institutions was determined, we gathered the name and email address of the dean or

director of the library through a review of institutional web pages. A survey invitation was sent to each of these individuals (n=758) with a link to the survey (which was available through Survey Monkey). The survey was open March 22–April 20, 2012. At two points during this period we sent follow up emails to those who had not responded to the survey as well as those who had responded but did not leave a name or institution (we were unable to remove their name from the distribution list).

Survey results & discussion

Response rate and characterization of the demographic of respondents

Of the 758 library deans and directors who received the email invitation to participate in the survey, 326 responded (or their designate responded) for an overall response rate of 43%. However, 45 respondents only answered Q1 (Does your institution have a formal undergraduate research program as defined by CUR?). This data was insufficient to analyze; we decided to remove these from our analysis.[27] This brought the total number of responses analyzed to 281 for a 37% response rate. Of this number, 79% (n=222) were members of the Council on Undergraduate Research, 15% (n=42) were members of NITLE, 14% (n=39) were members of the Oberlin Group, and 13.5% (n=38) were members of ARL. This represents a response from 35% of the CUR membership, 30% of the NITLE membership, 49% of the Oberlin Group membership, and 30% of the ARL membership. 10.7% (n=30) of the respondents did not provide identifying information and thus could not be characterized.[28]

Using the Carnegie Basic and Control Classifications, the types of institutions that responded can be characterized as follows: 3.6% (n=10) were classified as Associate level institutions, 24.9% (n=70) were classified as Baccalaureate level institutions, 34.5% (n=97) were categorized as Masters level institutions and 25.9% (n=73) were classified as Research institutions. A single institution (0.4%) was classified as a special focus institution. 39.1% (n=110) of the respondents were private, not-for-profit institutions; 50.2% (n=141) were public institutions. The highest number of respondents (n=97,

34.5%) were public, Masters level college and universities. We note that these percentages reflect the total population surveyed. Again 10.7% (n=30) of the respondents did not provide identifying information and thus could not be characterized. See Table 2 for a further breakdown of the respondents.

[Insert Table 2]

Institutional support for undergraduate research programs

Of the 281 analyzed responses, 85.4% (n=240) responded 'yes,' their institution had an undergraduate research program as defined by CUR or indicated in the other field that they had some form of support or were starting such a program. 14.6% (n=41) indicated that their institution did not have an undergraduate research program, they did not know whether such a program existed, or, in one case, that they found the definition unclear. Of the respondents that claimed their institution did not have a formal undergraduate research program, the researchers found evidence to the contrary for every response that provided the name of the institution.[29] We should note that the survey did rely upon the library dean or director's (or assigned respondent's) knowledge of their campus' involvement with undergraduate research programs. Two hundred and forty-one respondents (those that answered 'yes' or 'other') were sent to Q2, while those who answered 'no' or 'I don't know' (n=40) were sent to Q14 and did not see Q2–13.

For those institutions that do have undergraduate research programs, there seems to be representation across disciplines. Respondents to Q2 (n=235) outlined a wide-range of undergraduate research activities at their institutions including business (49.8%), education (44.7%), engineering (32.8%), fine arts (54%), humanities (68.9%), life sciences (79.1%), physical sciences (76.6%), and the social sciences (74.5%). Additionally, 29 institutions indicated undergraduate research present across all disciplines at their institution, usually within an honors program. The authors note that the literature

generally focuses on undergraduate research programs in the life and physical sciences (where much of the research takes place in laboratory environments), so this distribution is interesting. It is clear from examining websites of undergraduate research programs during the course of this study that while STEM fields have a longer history with undergraduate research programs, the arts, humanities and social sciences are gaining momentum.

Q3 (n=239) asked respondents to specify types of activities that are institutionally supported for the campus undergraduate research programs. Not surprisingly, the two most frequently reported activities for which the campus provided support are undergraduate research symposia (81.6%) and formal faculty mentoring (87%). 61.9% provided some kind of student funding for travel for research or to present at the growing number of national and international conferences that highlight undergraduate research.[30] To assist students in preparing for these experiences as well as for the preparation of manuscripts for publication, undergraduate research programs provide presentation and writing workshops (35.1%). Survey results indicate systematic archiving of student work is only slightly higher (37.7%) than the number of campus-supported undergraduate journals (32.6%), though we acknowledge that there could be some confusion between the two activities. A few respondents (3.3%) noted in the free text field support for undergraduate research through campus awards and summer research fellowships.

Ongoing library support for undergraduate research programs

Of the 241 respondents who indicated that their institution had undergraduate research programs as defined by CUR, more than two-thirds (68.5%, n=165) responded that their library provided some level of support for these programs (Q4). Six (2.5%) indicated that that they were beginning to plan specifically for support of undergraduate research programs. Private baccalaureate level colleges (40 or 23.4% of total) and public doctoral granting universities (43 or 25.1% of total)

were the most represented among these respondents. The disparities between these different types of institutions as seen in Table 3 would be interesting to explore. We speculate that the focus on undergraduates within private baccalaureate level colleges and the infrastructure for research support already in place at libraries within doctoral granting universities mean that these libraries are better placed to provide such services than perhaps some Masters level institutions. However, this would be an area for further research.

[Insert Table 3]

Of the 29% (n=70) that indicated that they do not provide support for undergraduate research programs, several reasons were cited (Q5). The most common response (77.6%) was that the library provides the same services to all undergraduates. Many libraries revealed they had not been approached to provide specific services for undergraduate research programs (59.7%) or reported that the institution has not needed support from the library (7.5%). Several respondents noted barriers that had prevented them from providing undergraduate research support: one library cited lack of communication between the library and the undergraduate research office, one had attempted to convince the undergraduate research office of the value of library-specific support only to have failed in the endeavor, and one faced resistance from librarians to take on additional duties. One respondent writes that the library had tried to get involved in the undergraduate research symposium, but that "the faculty at the college is resistant to incorporating a library research component into the program." Of course, the stress that some libraries are facing due to staffing and resource shortages was also a factor: 20.9% indicated that they did not have the resources required and 19.4% indicated that they did not have the necessary staffing; one respondent noted, "Due to severe understaffing of librarians, many of the things we would like to do to support undergraduate research are on hold so we can maintain basic services and keep the building open." The 70 respondents who answered 'no' to Q4 were sent from Q5

to Q14 to provide demographic information and did not participate in Q6–13; this left 171 respondents who had replied ‘yes,’ ‘I don’t know,’ or ‘other’ to reply to Q6–13.

Given that undergraduate research programs span across disciplines, the researchers suspected subject specialists would be assigned to support undergraduate research programs as part of their liaison responsibilities. More than half of the respondents (59.9%) of Q6 (n=168) affirmed no single librarian has been assigned to provide support to campus undergraduate research programs. Several respondents noted that while one librarian may have a responsibility to liaison directly with the Undergraduate Research Office or to manage a research showcase, in general these responsibilities are spread among subject liaisons and instructional librarians.

[Insert Table 4]

Q7 (n=164, 95.9% response rate) asked respondents to select the types of services that the library provided (see Table 4). Of the services libraries provide to support undergraduate research programs, instruction (86%) is the most common. This, however, does not seem to carry over into the development of instructional and informational materials specific to undergraduate research and made available on the web. Only 23.5% of the respondents to Q10 (n=162, 94.7% response rate) said that they provided such materials, while the bulk of respondents (60.5%) stated that such materials supported all undergraduates. Respondents shared a range of information literacy efforts including advanced database searching, citation management, and creation of online guides and instructional videos.

With undergraduate research experiences often taking place outside the traditional classroom experience, several respondents noted (n=14, 8.5%) one-on-one consultation work with students that resembles research support for faculty. Many libraries (54.9%) offer their space specifically for undergraduates participating in formal research (e.g. collaboration space, study carrels) and two

institutions noted committing library space in order to house campus honors program offices. Approximately one-quarter of libraries indicated they are specifically targeting undergraduate research programs through dedication of collections (26.2%), online and print, and extended loan periods (22%). Comments from respondents also (n=14) mentioned special and graduate-level collections available to all, interlibrary loan of dissertations, and a willingness to purchase online and print materials as requested (e.g. they did not have special funds set aside for undergraduates).

Libraries are expanding their mission to include the dissemination and preservation of institutionally-based research through the formation of institutional repositories and increasingly, this includes original undergraduate work. A little less than half of libraries are involved in the dissemination and preservation (48.2%) of undergraduate student work while one-fifth of libraries indicated they are administering publishing support (21.3%) for undergraduates. Students contribute to the scholarly conversation in a variety of ways (e.g. posters, papers, art, multimedia) and libraries are responding by expanding publication support in the form of printing posters and publications (19.5%) as well as providing instructional opportunities to assist students with the design of research posters and publications (17.7%). A small group (n=4) mentioned displaying undergraduate research posters within library space. Libraries are also joining departments and campus administration in recognizing undergraduate contributions to scholarly work by implementing awards (29.9%). Two respondents mentioned allocated funds for students who use special collections as part of their undergraduate research, with one library offering two $1,000 fellowships every semester.

We cross referenced the data between Q6 and Q7 to ask: If a library indicated there was a dedicated librarian (as opposed to having responsibility diffused within the organization) to support formal undergraduate research, in what ways does this translate into services provided? Of the libraries that had assigned a specific librarian to support undergraduate research programs (n=36), the most

common support cited is information literacy instruction. Qualitative data suggests that assigned librarians also support monetary awards, display of selected posters, serve on research committees, team-teach within undergraduate research programs, offer a week-long thesis camp, host a student journal, and provide support for required research appointments with a librarian. Whether there are more or richer services offered where there is a dedicated librarian(s) is an area for further research.

Publishing support from libraries for undergraduate research programs

Fifty-two percent of the survey respondents (n=88) responded to Q7 regarding the type of library support for the publishing process. Over half of the respondents provided support for preservation of student publications (58%), 28.4% are hosting undergraduate student journals, while 43.1% are hosting undergraduate research symposia and poster sessions either on their own or in conjunction with other units on campus. One respondent mentioned that their consortium was planning to support an undergraduate research journal for its members. Despite the large amount of support for instruction found in Q7, a smaller percentage (43.1%) provided instructional support regarding the publishing process and copyright. One-fifth of libraries are providing assistance with securing rights (21.6%) and more than one-third are involved in advocacy and education around open access publishing (38.6%). While the survey did not explicitly ask whether institutions were using institutional repositories (IRs), they were mentioned (n=33) throughout the qualitative responses. IRs housed honors theses and symposium award winners, journals, and posters. One respondent lamented, "I would like to be able to offer an archiving function for theses and symposium presentations … but the funding is not there."

Other responses to types of library support for undergraduate research

The free text responses to Q7, Q8, Q10, and Q12 (n=60, 24.9% response rate) give a glimpse of the range of other services that libraries offer: housing the honors program office in the library,

participating in faculty development and open forums associated with undergraduate research, workshops taught in collaboration with campus writing centers, and providing information technology support (e.g. course management system support, media support). In one case, a respondent mentioned that undergraduates enrolled in the honors program are required to have a research consultation with a librarian. One respondent is developing an empirical reasoning lab focused on analysis and use of data by undergraduates. Another respondent mentioned maintenance of a bibliography containing student research opportunities and grants outside the institution. Several institutions noted that librarians served as mentors for undergraduates involved in formal research projects. A handful of respondents also mentioned the role of special collections within undergraduate research; in particular, one noted that their archivist "just announced a new annual grant for faculty to develop student/faculty research programs using archival materials."

Representation of libraries in structure of undergraduate research programs

Q9 (n=162, response rate 94.7%) asked if libraries were represented in some form within the undergraduate research programs at their institutions. Of the respondents, 35.8% had someone from the library serving on advisory boards or steering committees, 14.8% aided in the design of curriculum, and 14.2% taught credit bearing courses. It is clear from the qualitative responses (n=29) that libraries are contributing in additional ways. For example, five respondents mentioned that librarians are serving as mentors, advisors and/or sponsors for undergraduate researchers. Seven respondents volunteered that their librarians have served as judges for posters and papers presented at student conferences. Not all libraries are so embedded; 39.5% indicated that they are not represented within their campus undergraduate research programs.

Interest in a national forum on library support for undergraduate research

Q13 (n=226, response rate 93.8%) asked whether the respondents would benefit from a national forum through ACRL or other association to discuss issues related to support for undergraduate research programs. 66.8% of respondents answered 'yes,' while 6.2% answered 'no.' 22.6% indicated that they did not know whether this would be beneficial. The free text responses indicated that the benefit of such a forum would depend on the content and scope. One respondent requested that such a forum include a focus on what community colleges are doing and can do in this area.

Discussion

In conducting this survey, we hoped to provide a study that would be a benchmark for the range of services libraries offered for formal undergraduate research programs. The survey revealed that most libraries at institutions with an undergraduate research program are offering at least some kind of support for such a program although services are not consistent across type of institution. Many libraries are, in fact, already adapting existing services (e.g. collections, space) to the distinctive needs of the undergraduate researcher. However, many respondents noted that the library provides equal services to all undergraduate students. This leads us to ask the question—are the changes in higher education curriculum and the growth of formal undergraduate research programs substantive enough that libraries should be re-envisioning how they provide support? Stamatoplos challenges librarians to see undergraduate researchers through a new lens, that "... people involved in original scholarship are different kinds of information users than those some librarians are used to and plan for, particularly where serving undergraduate students is a primary concern."[31] The responses also provide some anecdotal evidence of the choices and challenges some libraries have in terms of the specificity of support that is possible for undergraduate research programs. One respondent, reflecting on this question, writes that there is an "…ongoing discussion whether to raise the floor or the ceiling for

student success: do we provide more support for the weakest students or the better ones? Small staff forces such choices." Yet another noted that at their institution, undergraduate research was so embedded into the normal curriculum that it was difficult to answer the survey because of the survey's assumption that undergraduate research is different. We suggest that this question—which at its core is about the value of library support specific to undergraduate research programs—is not resolvable without further research.

We were interested in areas that we perceived to be growth areas for support, particularly publishing and dissemination of undergraduate research. Support of undergraduate research programs can provide a way for libraries and librarians to develop services that builds the researcher's experience as a knowledge producer. Throughout the survey responses were examples of libraries playing a strong role in the support and dissemination of undergraduate research. By adopting the role of publisher, libraries have the opportunity to evolve information literacy instruction to engage undergraduate researchers on issues of intellectual property, copyright, and open access; as noted earlier, however, it appears that fewer are offering this type of focused instructional support. In collecting and publishing undergraduate work, libraries create new resources for students to build on in future years, contribute to the institution's historical record, and perhaps most importantly, disseminate an underused body of knowledge. We hypothesized that changing attitudes toward the value of undergraduate research would mean support of undergraduate research journals, as well as dissemination and preservation of student research through infrastructure like institutional repositories. Regardless of the pros and cons for a student publishing in an undergraduate-only journal,[32] access to preserving original student work is growing as indicated by the number of libraries (n=58) confirming the intention and/or ability to host student journals in addition to collecting student work for inclusion in an institutional repository. We believe that this supports an ongoing shift away from faculty and

graduate student research as the sole focus of an institutional repository, and reflects the results of a survey by Berkeley Electronic Press in 2010, which found that 86.4% of respondents thought that "showcasing student work in the IR will become a growing trend in the following year."[33] For libraries that currently offer limited support, one of the central themes interwoven throughout the survey comments suggests that preparation is underway to support undergraduate research programs (n=31) by hosting student journals, research awards, and participation in scholar's day activities.

As undergraduate researchers tackle original research problems, the traditional lines that have demarcated the undergraduate from the graduate will blur. Some libraries have recognized that the services that were created to support graduate-level work increasingly need to also serve the undergraduate student researcher. One respondent noted, "We recently developed what we are calling the 'empirical reasoning lab' within the library, along with a new data librarian position that is designed to support curriculum development, as well as student research in both qualitative and quantitative data production, analysis, and visualization." As library support for undergraduate research programs grows more sophisticated, it will be necessary to assess the needs of both the students and their faculty mentors in order to properly address more advanced research needs. One library mentioned conducting such an assessment; they used the results to identify areas, such as conducting literature reviews and working with statistical software, to cover in an open workshop series.

The survey comments also highlighted the collaborative work librarians are doing within undergraduate research programs. Undergraduate research programs are taking advantage of librarians' expertise to support the research process in ways which reside outside the "normal" scope of job duties. The survey results emphasize that libraries can establish strategic partnerships both in and outside the classroom with such programs and with the administrators and faculty who engage with undergraduate

student researchers as mentors and collaborators. Institutional strategic planning initiatives present campus programs (e.g. libraries, teaching excellence programs, writing centers) with an opportunity to align their services within re-envisioned curriculum. We note that discipline-based undergraduate research is only one example of the AAC&U's list of high-impact learning experiences of which librarians should be cognizant; the others include first-year seminars, learning communities, service learning, and internships. Regular environmental scans of undergraduate curriculum changes and campus activities will position librarians to adjust to a constantly evolving academic environment.

Conclusion

While the implementation of experiential learning opportunities across disciplines is changing the manner in which undergraduate students experience the academy, how can we define and uncover the value that libraries bring to undergraduate research? The results of the survey provide a foundation for librarians, educators, and administrators to better understand the range of services offered by their peer institutions. We hope that it can also provide a springboard for conversations on how to form stronger relationships between undergraduate research programs and libraries. There are significant areas for further research. Emergent areas to be further examined include examining the perceptions of the library through the lens of the undergraduate research program and faculty mentors, identifying how the library space can support high-impact learning experiences, exploring the role of special collections in undergraduate research programs, how an institutional repository can better support the curricular work of an undergraduate research program, developing pedagogical strategies for teaching students about the authoring process, and more closely aligning instructional programming for the undergraduate research experience with those of the graduate researcher (e.g. data management, scholarly communication). The next step for our research is to gain a deeper understanding of the value

and impact of the library's contributions to formal undergraduate research programs through case studies of libraries as well as a survey and follow up with administrators and faculty mentors.

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Notes

Appendix A: Survey Instrument

Investigating Library Support for Formal Undergraduate Research

In this survey, we are interested in collecting information about how libraries are providing support for formal undergraduate research programs. The Council on Undergraduate Research (CUR) defines undergraduate research as: an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline. (http://www.cur.org/about.html). Examples of such programs include:

a. Formal undergraduate research opportunities program (such as those offered through http://www.cmu.edu/bio/research/undergrad_research/)
b. Undergraduate research symposiums that highlight original and creative undergraduate work (such as http://www.learning.wisc.edu/ugsymposium/)
c. Undergraduate research journals that publish original undergraduate research (such as http://digitalcommons.iwu.edu/uer/)
d. Undergraduate honors programs (such as http://advising.ahs.illinois.edu/JamesScholar/)
e. Other formal initiatives that foster original undergraduate research or creative works (such as http://www.eui.illinois.edu/)

We are excluding from this definition research conducted as part a normal part of class work (outside of the framework of any of the described programs above) or work completed with an individual faculty member for compensation.

This survey has been reviewed and approved by the Institutional Review Board at the University of Illinois at UrbanaChampaign. We will not share information that could identify the responses of a specific institution in our analysis, but only the aggregated results and anonymized comments. Survey results will aid libraries and librarians by benchmarking the current state of library services to undergraduate research programs, and will inform the next stage of our research: examining best practices and strategies for library support of undergraduate research programs.

This survey is being conducted by Merinda Hensley (mhensle1@illinois.edu) and Sarah Shreeves (sshreeve@illinois.edu) at the University of Illinois at UrbanaChampaign and Stephanie DavisKahl (sdaviska@iwu.edu) at Illinois Wesleyan University.

This survey contains approximately 20 questions and should take 10–15 minutes to complete. You can skip most questions (except 1 and 14), and it is anonymous unless you want to provide your contact information for further follow up. The survey will close on April 20th. Thank you!

1. Does your institution have a formal undergraduate research program as defined above? (Required question)

_Yes *(sent to question 2)*
_No *(sent to question 14)*
_I don't know *(sent to question 14)*
_Other (please specify) *(sent to question 2)*

2. In what disciplinary areas does your institution have undergraduate research programs? (Check all that apply)

_Business
_Education
_Engineering
_Fine Arts
_Humanities
_Life Sciences (including Health and Agriculture)
_Physical Sciences (including Math)
_Social Sciences (including Psychology)
_I don't know
_Other (please specify)

3. On your campus, does your institution sponsor any of the following: (Check all that apply)

_Undergraduate journal
_Undergraduate research symposium
_Formal faculty mentoring of undergraduate research
_Systematic archiving of student work including creative pieces (e.g. final papers, research posters, videos, musical scores, etc.)
_Student travel funds available for students to attend conferences
_Presenting and writing workshops specifically designed to support undergraduate research programs
_I don't know
_Other (please specify)

4. Does your library provide support specific to any of the formal undergraduate research programs at your institution? Examples of support might be instruction specific to undergraduate research programs, space designated for honors students, collections funds specifically for undergraduate research, publishing support, and awards for outstanding undergraduate research. We are not including general support provided to all undergraduates.

_Yes *(sent to question 6)*
_No *(sent to question 5)*
_I don't know *(sent to question 6)*
_Other (please specify) *(sent to question 6)*

5. If no, why not? (Check all that apply) *(all are sent to Question 12)*

_We don't have the staffing required.
_We don't have the resources (e.g. space or funds) required.
_We offer the same services to all undergraduates.

_We have not been approached to provide support.
_The institution has not needed library support.
_I don't know
_Other (please specify)

6. Is there a specific librarian(s) at your institution assigned to support formal undergraduate research as a part of their position?

_Yes
_No
_I don't know
_Other (please specify)

7. What kind of ongoing support does your library provide for formal undergraduate research programs? Again, the Council on Undergraduate Research (CUR) defines undergraduate research as: an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline. Not included in this definition is research as part of a class or work completed with an individual faculty member for compensation.

_Space (e.g. collaboration space, study carrels)
_Instruction (e.g. information literacy skills, research ethics)
_Collections (e.g. a budget for special requests to support formal undergraduate research)
_Extended loan periods for undergraduates in formal research programs
_Design of research posters and publications
_Printing of research posters and publications
_Publishing support (e.g. hosting student journals)
_Dissemination and preservation (e.g. deposit of undergraduate research in local institutional repository)
_Awards (e.g. monetary, ceremony)
_I don't know
_Other (please specify)

8. If your library provides publishing support, what kind of support does your library provide? (Check all that apply)

_Instruction on publishing process and copyright (e.g. licensing, author rights, Creative Commons licensing)
_Assistance with securing rights for use of images, text, music, etc.
_Advocacy and education on open access publishing
_Hosting student journals
_Preservation of student publications (e.g. journals, posters)
_Hosting or collaborating with other units to sponsor conferences/poster sessions, etc.
_I don't know
_Other (please specify)

9. Is your library represented within the structure of any undergraduate research program on your campus in any of the following ways?

_Serve on an advisory board or steering committee

_Aid in designing curriculum
_Teaching creditbearing courses
_No, we are not represented with the structure of the undergraduate research program
_I don't know
_Other (please specify)

10. Does your library make available instructional, informational, or other materials on the web to support undergraduate research programs?
_Yes
_No, we offer online tools to help undergraduate research in general.
_No
_I don't know
_Other (please specify)

11. If yes, please specify those URL's or examples below.

12. Is there any other information you want to share about your library's support for undergraduate research programs?

13. Would you benefit from a national forum (through ACRL or another association) to discuss issues related to support for formal undergraduate research programs?
_Yes
_No
_I don't know
_Other (please specify)

14. Name of your institution
15. Job title of the person filling out the survey
16. Size of undergraduate student population
_Fewer than 1000
_1000–2999
_3000–9999
_10,000 or more

17. Number of librarians
_1–10
_11–20
_20–30
_30 or more

18. Are you willing to be contacted for a followup interview?
_Yes
_No

19. If yes, please provide your email address

Thank you for taking this survey on library support for formal undergraduate research programs. If you have any questions about this survey and this research, please contact one of the investigators:

- Merinda Hensley (mhensle1@illinois.edu)
- Sarah Shreeves (sshreeve@illinois.edu)
- Stephanie DavisKahl (sdaviska@iwu.edu)

We appreciate your time and effort!

Table 1: Total Population Surveyed by Carnegie Basic and Control Classifications

Carnegie Basic Classification	Private	Public	Total
Associate's Colleges	2 (0.3%)	37 (4.9%)	39 (5.2%)
Baccalaureate Colleges	**180 (23.7%)**	30 (4%)	210 (27.7%)
Master's Colleges and Universities	128 (16.9%)	**171 (22.5%)**	**299 (39.4%)**
Doctoral Granting Universiteis	65 (8.6%)	140 (18.4%)	205 (27%)
Special Focus	2 (0.3%)	2 (0.3%)	4 (0.6%)
Tribal	0	1 (0.1%)	1 (0.1%)
Total (n=758)	377 (49.7%)	**381 (50.3%)**	758(100%)

Table 2: Respondents Categorized According to Carnegie Basic and Control Classifications (n=281)

Carnegie Basic Classification	Private	Public	No info	Total
Associate's Colleges	1 (0.4%)	9 (3.2%)	0	10 (3.6%)
Baccalaureate Colleges	**59 (21%)**	11 (3.9%)	0	70 (24.9%)
Master's Colleges and Universities	35 (12.4%)	**62 (22.1%)**	0	**97 (34.5%)**
Doctoral Granting Universities	15 (5.3%)	58 (20.6%)	0	73 (25.9%)
Special Focus	0	1 (0.4%)	0	1 (0.4%)
No information given	0	0	30 (10.7%)	30 (10.7%)
Total (n=281)	110 (39.1%)	**141 (50.2%)**	30 (10.7%)	281 (100%)

Table 3: Respondents Who Support Undergraduate Research Programs by Carnegie Classification (Answered Yes or Indicated They Were Planning Support to Q4, n=171)

Carnegie Basic Classification	Private	Public	No info	Total
Associate's Colleges	0	4 (2.3%)	0	4 (2.3%)
Baccalaureate Colleges	**40 (23.4%)**	5 (2.9%)	0	45 (26.3%)
Master's Colleges and Universities	17 (9.9%)	35 (20.5%)	0	52 (30.4%)
Doctoral Granting Universities	10 (5.8%)	**43 (25.1%)**	0	**53 (31%)**
Special Focus	0	1 (0.6%)	0	1 (0.6%)
No information given	0	0	16 (9.4%)	16 (9.4%)
Total (n=171)	67 (39.2%)	**88 (51.4%)**	16 (9.4%)	171 (100%)

Carnegie Classification	Space	Instruction	Collections	Extended loan periods	Design of research posters and publications	Printing of research posters and publications	Publishing support	Dissemination	Awards	I don't Know	Other
Associate (n=4)	2	3	1	0	0	0	0	2	1	0	1
Baccalaureate (n=44)	25	42	18	18	8	11	3	28	13	0	8
Master's (n=50)	27	37	9	8	6	6	13	17	8	1	9
Doctoral (n=53)	30	48	10	8	13	14	16	28	23	0	11
Special focus (n=1)	1	1	1	1	0	0	0	1	0	0	1
No information (n=12)	5	10	4	1	2	1	3	3	4	2	0
n=164	**90 (54.9%)**	**141 (86%)**	**43 (26.2%)**	**36 (22%)**	**29 (17.7%)**	**32 (19.5%)**	**35 (21.3%)**	**79 (48.2%)**	**49 (29.9%)**	**3 (1.8%)**	**30 (18.3%)**

[1] Boyer Commission on Educating Undergraduates in the Research University, *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*, (Stony Brook, NY: State University of New York – Stony Brook, 1998).

[2] Some examples include: Maryland Council on Undergraduate Research: http://www.ugresearch.umd.edu and University of Washington: http://exp.washington.edu/urp/ and Emory University Summer Undergraduate Research Experience: http://www.cse.emory.edu/projects/students/sure.html.

[3] See: http://www.cur.org/about_cur/frequently_asked_questions_/ - 2

[4] See: Mary Crowe and David F. Brakke, "Assessing the Impact of Undergraduate Research Experiences on Students: An Overview of Current Literature in Press," *CUR Quarterly* 28 (2008): 3-50; Shouping Hu, Kathyrine Scheuch, Robert Schwartz, Joy Gaston Gayles, and Shaoqing Li, "Reinventing Undergraduate Education: Engaging College Students in Research and Creative Activities," *ASHE Higher Education Report* 33 no. 4 (2008): 80-81.

[5] George D. Kuh, *High-Impact EducationalPpractices: What They Are, Who Has Access to Them, and Why They Matter*, (Washington, D.C.: Association of American Colleges and Universities, 2008). See: http://www.aacu.org/leap/hip.cfm.

[6] Examples: the *American Physiological Society's* David S. Bruce Awards for Excellence in Undergraduate Research; the *Computing Research Association's* Undergraduate Researcher Awards; the *Psi Chi Allyn & Bacon* Undergraduate Research Awards, and the *American History Association's* The Raymond J. Cunningham Prize.

[7] Study Spaces, Oberlin College Library, http://www.oberlin.edu/library/students/scholar-studies.html

[8] UCI Libraries – UROP Partnership, http://www.lib.uci.edu/about/projects/urop/undergraduate-research-opportunities-program.html.

[9] Anthony Stamatoplos, "The Role of Academic Libraries in Mentored Undergraduate Research: A Model of Engagement in the Academic Community," *College and Research Libraries* 70, no. 3 (May 2009): 235-249.

[10] J. Strassburger., "Embracing Undergraduate Research." *American Association of Higher Education Bulletin* 47 (1995): 3-5; Toufic Hakim, "Soft Assessment of Undergraduate Research: Reactions and Student Perspectives," *Council on Undergraduate Research Quarterly* 18 (1998): 190; Gerald Graff, "On Defining "Research,"" 2006. Retrieved November 12, 2012 from http://reinventioncenter.miami.edu/spotlight.

[11] David Lopatto, "Undergraduate Research as a Catalyst for Liberal Learning," *Peer Review* 8 (2006): 23; John Mateja, Charlotte Otto, "Undergraduate Research: Approaches to Success," in *Invention and Impact: Building Excellence in Undergraduate Science, Technology, Engineering and Mathematics (STEM) Education*, Retrieved November 12, 2012 from http://www.aaas.org/publications/books_reports/CCLI; Sarah H. Russell, Mary P. Hancock, James McCullough, "Benefits of Undergraduate Research Experience," *Science* 316 (2007): 548.

[12] Lopatto, "Undergraduate Research as a Catalyst for Liberal Learning," 22.

[13] Russell et al, "Benefits of Undergraduate Research," 22; Shouping Hu, Kathyrine Scheuch, Robert Schwartz, Joy Gaston Gayles, Shaoqing Li, *Reinventing Undergraduate Education: Engaging College Students in Research and Creative Activities*, 33, ASHE Higher Education Report (2008): 38.

[14] Naomi Yavnch Klos, Jenny Olin Shanahan, Gregory Young, *Creative Inquiry in the Arts & Humanities: Models of Undergraduate Research*, (Washington, D.C.: The Council on Undergraduate Research, 2011).

[15] Laura L. Behling, *Reading, Writing & Research: Undergraduate Students as Scholars in Literary Studies*, (Washington, D.C.: The Council on Undergraduate Research, 2009).

[16] Heather Thiry and Sandra Lauren, "Evaluation of the Undergraduate Research Programs of the Biological Sciences Initiative: Students' Intellectual, Personal and Professional Outcomes from Participation in Research." Retrieved January 30, 2013 from http://www.colorado.edu/eer/downloads/BSI_URinterviewReport2009.pdf.

[17] Suzy Taraba, "Now What Should We Do With Them?: Artists' Books in the Curriculum," *RBM: a Journal of Rare Books, Manuscripts, and Cultural Heritage* 4 (2003): 109-120; Pablo Alvarez, "Introducing Rare Books into the Undergraduate Curriculum," *RBM: a Journal of Rare Books, Manuscripts, and Cultural Heritage* 4 (2006): 94-104; Julie Gardner and David Pavelich, "Teaching With Ephemera," *RBM: a Journal of Rare Books, Manuscripts, and Cultural Heritage* 9 (2008): 86-92.

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2001. Paper 32. Retrieved November 12, 2012 from http://digitalcommons.unl.edu/nchcschreyer2/32.

[19] Ibid. 129.

[20] Loanne L. Snaveley and Carol A. Wright, "Research Portfolio Use in Undergraduate Honors Education: Assessment Tool and Model for Future Work," *The Journal of Academic Librarianship* 29 (2003): 301.

[21] Stamatoplos, "The Role of Academic Libraries," 235-249.

[22] Emily Daly, "Is the Library Part of the Picture? Asking Honors Undergrads to Describe their Research Process," *C&RL News* 72 (2011): 410.

[23] Daly, "Is the Library Part of the Picture? Asking Honors Undergrads to Describe their Research Process," 410.

[24] Stamatoplos, "The Role of Academic Libraries," 240.

[25] See: http://www.cur.org; http://www.arl.org; http://www.oberlingroup.org; http://www.nitle.org.

[26] See http://classifications.carnegiefoundation.org/.

[27] Of these 45, 6.7% answered 'I don't know,' 6.7% answered 'no,' and 86.6% answered 'yes.' This closely mirrors the responses of the remaining 281 analyzed results.

[28] Note that because there is overlap in membership, these numbers will not add up to 100%.

[29] The researchers performed Internet searches of "Institutional name" + "undergraduate research." In every case this led to institutional pages of symposia, grants funding opportunities, institutional repositories, etc.

[30] Examples: http://nchchonors.org/annual-conference/, http://www.jmu.edu/sponsprog/ncur.html, and http://www.ymc.osu.edu/.

[31] Stamatoplos, "The Role of Academic Libraries in Mentored Undergraduate Research: A Model of Engagement in the Academic Community," 239-240.

[32] Although written before the growth of institutional repositories, scientists debate the pros and cons of students publishing in undergraduate-only journals: Scott Gilbert, John R. Jungck, and Vivian Siegel, "Should Students Be Encouraged To Publish Their Research in Student-Run Publications?" *Cell Biology Education* 3 (2004): 22-27.

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